DOCUMENT RESUME

ED 226 346 CS 207 332

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TITLE Where the Real Things Are.
PUB DATE [80]
NOTE 18p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Concept Formation; Critical Thinking; *Discovery Learning; Elementary Education; Hypothesis Testing; *Inquiry; Instructional Improvement; *Integrated Activities; Learning Activities; Questioning Techniques; Science Instruction; Social Studies; *Student Interests; Student Teacher Relationship; *Teaching Methods; *Writing Exercises; Writing Instruction

ABSTRACT

When teachers present students with real topics in science and social studies instead of artificial, abstract writing exercises, the students will both develop and extend their interests and learn to think and communicate clearly about them. Choosing such a topic provides an opportunity to discuss student interests. Next, list building and small group discussion can be used to find out what the children know about the topic and how their knowledge is organized. When new information is presented, the teacher must guide the children's observation, stressing capacity for appreciation as well as accuracy and keenness. Children should be encouraged to use more and more properties to classify data and to realize that there is no single "right" way to classify. Recording what they have classified helps children remember what they have learned and is in itself a way to communicate clearly to others. Questions encourage students to hypothesize and help them understand the process of decision making. The way a teacher presents data can help students realize that inferences are not absolute truths and that there is room for opposite opinions. A reprise exercise reviewing the steps that led to a hypothesis and repeating the opening listing activity provide effective reminders of how far the students have come. An inquiry nearing completion also points the way to the next one. (JL)

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## WHERE THE REAL THINGS ARE

James Moffett has observed that

> ....when children discover that they have worked hard at something that is not 'real' after all but just a teacher's invention for his own purposes, they feel cheated and resentful. (1973, p. 128.)

My personal share of student cynicism about composition was generated by the "story starters" used by my third grade teacher. These were unfinished sentences of little color and of bland texture which we were to vitalize and elaborate into "interesting" paragraphs. My efforts were strained, uninformed, inconsistent, motivated solely by my third grade urge to comply, and singularly devoid of satisfaction and meaning. I had worked hard at something that was not real.

But I have learned where the real things are. I have seen primary aged children observing and recording details, concentrating without strain to make distinctions among observed traits, and sharing with others, in clear and concise language what they have learned. These children are using and receiving language in many forms, and are doing so with intentionality and obvious satisfaction. They are observing, interviewing, reading, classifying, record keeping, and writing with pleasure. They are producing descriptions, discussions, elaborate comparisons,

charts, graphs, booklets, lists and stories. Analogies are used, and labelled line drawings, and extrapolations from what is known by the group. These children are absorbed in their work. What are they doing? They are "doing" science, or they are "doing" social studies, and they are clearly "doing" language arts. And they are not cynical.

> "Most profoundly considered, a course of language learning is a course in thinking ...conceiving and verbalizing must be taken together...But the stuff to be conceived and verbalized is primarily the raw stuff of life, not language matters themselves.
> (Moffett, 1973, p.11.)

Children, especially very young children, are thought by adults to be acutely curious about the "raw stuff" of life: themselves, other people, animals, and objects both natural and manmade. The teacher who encourages serious investigations of such topics during school time, and who plans for related "concept learning," simultaneously presents to children:

1) something real to think/verbalize/write about, and

2) a way to learn to think/verbalize/ write about.

To illustrate the point: we expect children, at various stages of their language learning, to:

describe an object or event
present information systematically
write concisely and clearly
record events chronologically
combine recalled experiences, observations and reading to infer their own point of view

communicate the same information in a variety of forms
form an opinion and support it logically
explain a process
include appropriate details
and perceive relationships among several ideas.

I believe that each of those skills is learned by children as they are "sciencing" or social studying." It is while they are practicing the processes shared by these two disciplines that they learn how to develop and extend their interests, and how to think and communicate clearly about them.

What follows is one approach to planning for an integrated investigation which could be either science or social studies, but which has many language opportunities and aspects. This plan assumes a classroom atmosphere in which children are encouraged to make decisions, and to take responsibility for their own learning and materials. This means that each study group will need space to organize its materials, and time for members to work individually, as well as with the group. In addition, the teacher should have high expectations, while maintaining an appropriate developmental level. One topic leads to another in such a classroom, and children should discuss the fact that learning one concept often introduces another exciting aspect or a new direction.

The example referred to is a social studies topic (habitats), but the reader should bear in mind that it

has many scientific aspects: animal habits, properties of building materials, and others, which could also be a focus of the investigation. The processes, or activities, would be the same.

The major focus is on the processes the children are using, although final products, charts, compositions, booklets, presentations and the like can and should be the best the children are capable of, polished and perfected to the level and size of the intended audience.

What to Study

The topic may be one selected by the teacher, or can be drawn from something of interest to the children. Deciding what to study is a group problem of real dimensions, and affords excellent discussion opportunities. One child's hobby or special interest may become the subject of investigation for all, or an unusual artifact may initiate a far-flung inquiry. The topic may be expressed as a question, a problem, a puzzle, a concept, or simply as a "topic." Some (variously stated) which have been investigated successfully by first graders are:

| SCIENCE | SOCIAL STUDIES |
|---|---|
| Changes in the Kitchen | Money and Buying |
| Light and Shadow | Needs and Wants |
| Plants: Food from Earth | Rules |
| Pond Animals | Habitats |
| Holes | People with Special Needs |
| Soap | How T.V. Affects Us |
| Weather | What is Life on an Island Like? |
| Birds | |

Simple Machines
Senses
Water
Magnetism and Gravity
Color

Families
Schools
Team Sports
Railroads
Emotions
How People Pollute

Getting Started

First, find out what the children know, or think they know, about the topic or problem. Build a list of all the information they have, corporately, and arrange to keep this for the duration of the investigation. Some children may wish to keep up-dating it. If children are not readers, use pictures, or a tape recorder. Follow this list-building with small group discussions, in which children group those items which "belong together." Items thus combined then are labelled by the children. ("This is a group of ....," or "These go together because they all....") Essentially, this is Hilda Taba's "Concept Formation" strategy, which the teacher can use to diagnose what the children know and how they have their knowledge organized. Misinformation will be evident, as will gaps in children's information about the concept; some children will know a great deal more than others. From this starting point, a kind of "closed" inquiry can be planned; the teacher may outline a number of generalizations considered essential knowledge on the topic. Over the time frame allowed, children will gradually be led in the direction of those generalizations. (After a few experiences with this type

of investigation, many teachers move to more "open" inquiry, in which generalizations and inferences are not pre-selected.) If the topic were "habitats," perhaps the important ideas include: "many animals make their habitats," "habitats' forms fit the needs of the inhabitor," and "humans make habitats which reflect the climate." Each of these might include several subordinate ideas, of course. The teacher's role, initially, is to choose and provide the materials and other means for children to approach such inferences by their own gradual efforts. This role of providing sources of information is eventually shared with the students. The teacher should provide guidance and support to students, ensuring that their investigation is as thorough as is age-appropriate. The first activity is observing; it is repeated many times, since many sources of information are presented to children, one or two pieces of data at a time. Timing is of the essence; the alert teacher will sense when each group has extended the usefulness of the information or the artifact, and is ready for another "piece of the puzzle."

Observing

When presenting children with the data source (a picture, event, reading material, or artifact," the main concern is that the children observe all that there is to learn from that source. They often tend to jump to con-

clusions, and tend to be very cursory in their examination of details. The teacher should encourage thoroughness, ("What else do you see?") focusing attention on each of the salient elements which will be part of the final understanding of the concept.

While it is true that young children can be acutely perceptive, they need guidance, since they often focus on what they want to see and ignore all else; their ability to observe is influenced by their experience. Brief comments on unnoticed aspects can help. Helping children to focus on one sense at a time is recommended by J. Moffett. They need help to comment on likenesses, and to notice differences. Not only accuracy and keenness in observation, but also capacity for appreciation would be goals here. Some record can be kept of new information gained from each new source. Children should decide whether their observations add to, contradict, or reinforce items on their original list of what was known by the group. This recurring discussion is often lively, and affords opportunity to practice making the distinctions necessary.

Classifying

Classifying is a skill well practiced in most preschool and primary programs. One reason for this is that there are so many commercially prepared materials available which require the child to match or sort. Whether the materials are beads in the hand of the youngest child or

bits of information about science concepts or social studies problems, the material can be classified in any number of ways. Children need help to make use of more and more properties, so that they are confident about increasingly complex ordering. Sorting by physical properties such as: weight, size, color, size, shape is the first level. Sorting by two or more of these properties is the next level of difficulty. Sorting by function, or by reaction, is another possibility. Organizing into subordinate categories is an advanced skill. Children need numerous materials which are possible to categorize in many ways. One of the most important lessons to learn here is that there are many correct ways to classify, not one "right" way. Children should explain how each has made this decision, and respect differing approaches.

Recording

There are two reasons for children to record what they have classified. Recording helps them to remember what they have learned or decided. Recording is in itself a way to communicate clearly to others. Teachers of the very young child need to realize that many products of the pre-school child's experiments are, in reality, a form of record of the child's discovery about the materials used. A structure of blocks and rope is a record of learning. So are drawings, models, dead plants, appliance, and every other conceivable "product" on which children

have worked. Collections, ordered and perhaps labelled, are records. Stories, charts, graphs, interviews, and line drawings are a record of investigations, and may be considered language activity, since they manifest thinking processes necessary for language productions. Even the simplest "yes/no" charts are records about which children can explain. ("Foods our pet will eat"/"Will not eat") Experience stories and measurements are forms of scientific recording. Perhaps the most valuable are topical booklets produced by several children, since these are easily kept, enhance the classroom reading materials, and represent a standard of production for other children.

Proposing/Hypothesizing

Children are easily satisfied with their own explanations. They will generate reasons for what they have observed, but will not test the reasons unless the teacher can help them decide why to test (to find out if the reason is true," and how to test. This process is begun by the teacher encouraging the students to say what the child has observed. "All our pictures of Boston showed brick houses." "Then what might you say about Boston, so far?" "That all houses in Boston are brick...but there were trees in the pictures, too, so why wouldn't they have wood houses?" How can we find out if it is true that all Boston houses are made of brick?" The

latter is the question which encourages children to make decisions about HOW to learn. Note that only children who can anticipate consequences would be able to respond to this part of the inquiry. One way to determine if children are thinking in this way is to listen for and to elicit "If...then" statements. ("If we could find someone who has been to Boston, then we could ask them.") During the discussion which this decision necessitates, middle-graders extend and clarify each others' thinking. Children may decide to take a trip to Boston to see, or to search for more pictures of the city, or to interview someone who has been to Boston. An important aspect of this discussion about "how could we learn" is that children will reveal different ways of approaching the problem. Both teacher and students should be aware of this. While the decision about how to proceed is being reached, the teacher should be careful to emphasize two attitudes: tolerance of diversity, and willingness to weigh relative merits of each way of proceeding. Too much haste to accept one approach will truncate an excellent thinking/language opportunity.

Farther along in the unit, after the truth has been learned about Boston, suppose the group has concluded that human habitats are different in various parts of the world because "the people there just LIKE grass houses," or brick, or any other material. The teacher might counter with: "How can we find out if that is the real reason for

the differences we've found?". Having heard several students' ideas, the teacher might ask: "If we use Jay's idea, to check encyclopediae and books, will we find out different KIND of information than if we use Erin's notion of interviewing people who design homes around here?", or "How would Donna's idea, to collect pictures of all kinds of homes and group them, as we did when we were studying animal habitats, help us?". The process of decision making is probably as important as the actual decision, because it involves children in an issue critical and real to them: what shall we do in order to learn more?

Inferring

Whichever ways the children decide to approach the problem, there should be sufficient and varied sources of information and materials for the observing/classifying/recording/proposing processes described above. As each new artifact or picture or other source of information is presented, the children seek patterns in what they have learned, gradually combining these patterns into a generalization. One attitude which may be fostered during this stage in the study is a healthy skepticism. In inferential thinking, it is never possible to examine ALL the possible sources of data, so we are dependent on examining as many accurate sources as we can, thus arriving at a reasonable approximation of the truth about the topic. Absolute truth cannot be achieved inductively, so our knowledge is not certain. Children can be

helped to understand how this is true. Equally well-informed experts on the same topic may hold opposite points of view. Data to persuade the students to one point of view may be presented, one source after another until they are nearly convinced that "such and such" is true. Then, sources of data which logically lead to an opposite conclusion may be examined. Another tactic is to include extraneous pieces of information in the data, then teach students how to identify what appears to be relevant, but is not. Children take great delight in "figuring out" where the teacher has inserted these "tricks." Because both teacher and students rejoice in their astuteness, no child need feel inappropriately misled. Such tactics are tools intended to help children become more independent thinkers: more discriminating in selecting sources of data, more careful in noting discrepancies, more quick in sensing dissonance between conflicting pieces of information.

A Reprise Technique

This reprise technique is not suitable for the young child, who is not capable of such abstract analysis, but is included here because some children of six or seven have demonstrated ability to participate. Even with older students, it takes practice and patience.

After employing a combination of ways to find the explanation for different styles and materials of human

habitats, the children in our example may infer that such homes are made of materials near at hand, and that what is at hand is determined by the climate of a place. If this was the generalization which the teacher planned for them to achieve, and all the children are now attuned to it, being convinced that all the pieces of information examined over a few weeks' inquiry do support this conclusion, the unit does not come abruptly to an end. It is seldom indeed that we ask children to think aloud about their own thinking. Here is an opportunity to do so. Remind the children about the beginnings of the unit, and the first sources of data they examined. Ask one child to explain what patterns were first noticed by that child, and what ideas "reminded you of other things." Ask the same student to retrace, aloud, the memorable sources of information, and the way in which ideas began to come together, especially when the realization that climate was involved in the solution began to be clear. By having two or three students share their thinking processes aloud in this fashion, the teacher can point out again that "different is not necessarily wrong," that divergence is to be valued among thinkers, and that some methods of processing information might be more effective, or more efficient, than others. It is possible that children would learn from other children who seem to have more effective information processing skills, and have been able to describe how they discard ideas, and arrange those they consider relevant.

What Have We Learned?

One effective way to review and evaluate what has been learned in such an investigation is to repeat the opening activity:

a) Have children list what they know about the topic using one card for each item.

b) Direct groups to show "what goes together" by classifying cards.

c) Instruct the group to label each of these subsets.

If the list is extensive, as it is likely to be following an investigation of several days or even weeks, parts b and c might be done on another day.

The spirit of this wrap-up should be shared pride and joy at how much the group has learned (in terms of information gained,) and how their thinking/language arts skills have improved. There will be tangible evidence of this if the list from the opening activity has been saved and can now be compared with the wrap-up counterpart, or if the teacher has tape recorded discussions in which children presented and defended their ideas. Other products of the study, such as classification charts, booklets on the topic, posters, and speeches may be enjoyed now by all with a real sense of accomplishment and shared enterprise.

What's Next?

The next topic of investigation usually arises from one nearing completion. Children studying habitats, for

instance, might ask how climate differs from weather, or what other differences are imposed on humankind by climate. "How would my life be different if I lived in a different climate?" Thus, new inquiry is born; an investigation involving both sciencing and social studying, and requiring every language and thinking skill at the students' command. Best of all, there is something real to think and talk and write about. Something that matters.

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